PHEX gene

phosphate regulating endopeptidase homolog, X-linked

Normal Function

The *PHEX* gene provides instructions for making an enzyme that is active primarily in bones and teeth. Studies suggest that it cuts (cleaves) other proteins into smaller pieces; however, the proteins cleaved by the PHEX enzyme have not been identified.

The PHEX enzyme could be involved in regulating the balance of phosphate in the body. Among its many functions, phosphate plays a critical role in the formation and growth of bones in childhood and helps maintain bone strength in adults. Phosphate levels are controlled in large part by the kidneys. The kidneys normally excrete excess phosphate in urine, and they reabsorb this mineral into the bloodstream when more is needed.

Studies suggest that the PHEX enzyme may be involved in the regulation of a protein called fibroblast growth factor 23 (which is produced from the *FGF23* gene). This protein normally inhibits the kidneys' ability to reabsorb phosphate into the bloodstream. Although the PHEX enzyme is thought to have some effect on the activity of fibroblast growth factor 23, no direct link has been established. It remains unclear how the PHEX enzyme helps control phosphate reabsorption and what role it plays in the formation and growth of bones.

Health Conditions Related to Genetic Changes

hereditary hypophosphatemic rickets

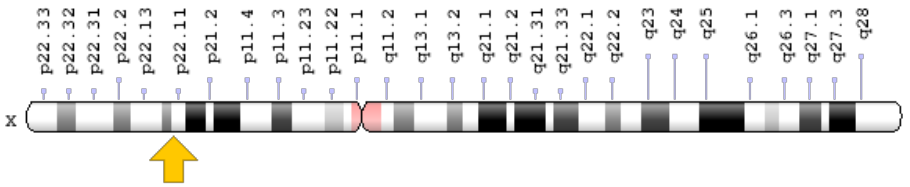
More than 200 mutations in the *PHEX* gene have been found to cause the most common form of hereditary hypophosphatemic rickets, which is known as X-linked hypophosphatemic rickets. These mutations inactivate the PHEX enzyme, leaving it unable to cleave other proteins.

Researchers are uncertain how mutations in the *PHEX* gene lead to low levels of phosphate in the blood (hypophosphatemia) and related problems with bone growth in people with X-linked hypophosphatemic rickets. Because many affected individuals have increased levels of fibroblast growth factor 23, it is likely that *PHEX* gene mutations somehow alter the production of that protein. An increase in fibroblast growth factor 23 reduces phosphate reabsorption by the kidneys, leading to hypophosphatemia. However, because some affected individuals have normal levels of fibroblast growth factor 23, researchers are also considering other pathways by which a mutated *PHEX* gene could result in X-linked hypophosphatemic rickets.

Chromosomal Location

Cytogenetic Location: Xp22.11, which is the short (p) arm of the X chromosome at position 22.11

Molecular Location: base pairs 22,032,327 to 22,251,310 on the X chromosome (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- HPDR
- HPDR1
- HYP
- HYP1
- metalloendopeptidase homolog PEX
- PEX
- PHEX_HUMAN
- phosphate-regulating neutral endopeptidase
- vitamin D-resistant hypophosphatemic rickets protein
- X-linked hypophosphatemia protein
- XLH

Additional Information & Resources

Educational Resources

- Endocrinology: An Integrated Approach (2001): Vitamin D resistance and rickets https://www.ncbi.nlm.nih.gov/books/NBK24/#A930

GeneReviews

- X-Linked Hypophosphatemia https://www.ncbi.nlm.nih.gov/books/NBK83985

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28PHEX%5BTIAB%5D%29+OR+%28%28PEX%5BTIAB%5D%29+AND+%28rickets%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D

OMIM

- PHOSPHATE-REGULATING ENDOPEPTIDASE HOMOLOG, X-LINKED
  http://omim.org/entry/300550

Research Resources

- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=PHEX%5Bgene%5D
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=8918
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/5251
- PHEXdb: PHEX Mutation Database
  http://www.phexdb.mcgill.ca/
- UniProt
  http://www.uniprot.org/uniprot/P78562

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